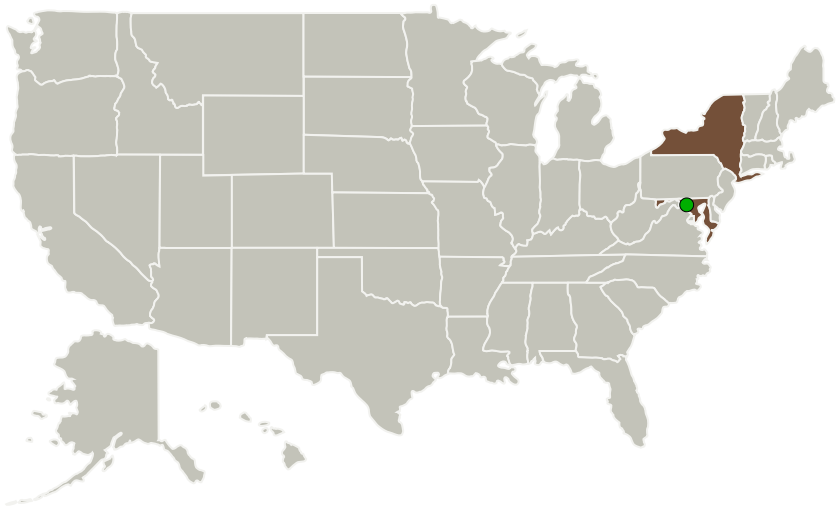
Polarimetric Multiwavelength Focal Plane Arrays for ACE and CLARREO, Phase II

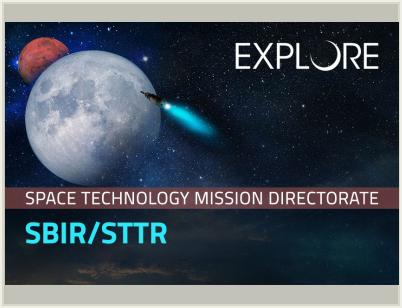
Completed Technology Project (2010 - 2012)

Project Introduction

High-performance polarimetric and nonpolarimetric sensing is crucial to upcoming NASA missions, including ACE and CLARREO and the multi-agency VIIRS NPP project. The objective of the proposed project is to use single-layer metamaterial metal/dielectric composites to develop multiwavelength polarimetric focal plane arrays (FPAs) that far exceed performance requirements for ACE and CLARREO, while reducing costs through component integration. Phoebus's metamaterial films are an enabling technology and can be used to develop high spectral resolution, low-crosstalk components for other NASA missions, such as GEO-CAPE, as well as transparent metal contacts for high-efficiency sensors and solar cells. Phoebus's metamaterial films can eliminate several problems with current polarimetric detectors, such as diffraction, light scattering, moving parts, and the need to dice/bond components. This project will use recent discoveries in metamaterials research that allow for polarimetric control of the flow and focusing/superbeaming of light, concepts that have been analytically and experimentally verified during Phase I. Phoebus's Phase I results confirmed that its structures will allow for 2500x improvement in polarization extinction ratios - the key performance metric for polarimetric detectors ⬌ compared with currently available polarimetric detectors. Phase I results also confirmed that the relevant structures can be fabricated using routine materials and fabrication techniques in widespread use throughout the semiconductor device industry. In Phase II, Phoebus will focus on improving several performance metrics of its polarizing filter arrays, such as wavelength selectivity and transmissivity, as well as optimizing fabrication processes necessary to produce high aspect ratio light-channeling dielectric apertures.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Phoebus Optoelectronics, LLC	Lead Organization	Industry	Brooklyn, New York
Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Maryland	New York

Project Transitions

February 2010: Project Start

February 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139338)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Phoebus Optoelectronics, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

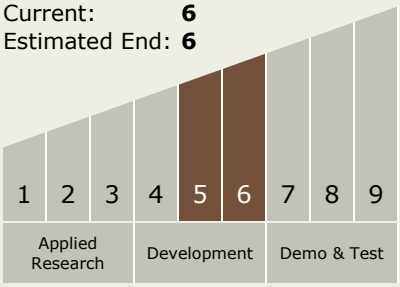
Carlos Torrez

Principal Investigator:

Chris Sarantos

Technology Maturity (TRL)

Start: **5**
Current: **6**
Estimated End: **6**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System